

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
17 July 2003 (17.07.2003)

PCT

(10) International Publication Number
WO 03/057707 A1

(51) International Patent Classification⁷: **C07H 17/04**,
A23L 1/302, C12P 19/60, C07H 1/08, A61K 7/48,
31/7048, A61P 17/16

(JP). NAKAO, Masahiro [JP/JP]; B1-102, Takenodai,
Nagaokakyo-shi, Kyoto 617-0827 (JP). FUKAMI,
Harukazu [JP/JP]; 36, Kissyoinshimadezaike-cho, Mi-
nami-ku, Kyoto-shi, Kyoto 601-8373 (JP).

(21) International Application Number: PCT/JP02/13857

(22) International Filing Date:
27 December 2002 (27.12.2002)

(74) Agent: MURAKAMI, Kiyoshi; YUASA AND HARA,
Section 206, New Ohtemachi Bldg., 2-1, Ohtemachi
2-chome, Chiyoda-ku, Tokyo 100-0004 (JP).

(25) Filing Language: English

(81) Designated States (*national*): AU, CA, CN, JP, KR, US.

(26) Publication Language: English

(84) Designated States (*regional*): European patent (AT, BE,
BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT,
LU, MC, NL, PT, SE, SI, SK, TR).

(30) Priority Data:
2001-400258 28 December 2001 (28.12.2001) JP

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

(71) Applicant (*for all designated States except US*): SUN-
TORY LIMITED [JP/JP]; 1-40, Dojimahama 2-chome,
Kita-ku, Osaka-shi, Osaka 530-8203 (JP).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): MAEDA, Mitsuru
[JP/JP]; 2-15-5, Kinugawa, Otsu-shi, Shiga 520-0244

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: 2-O-(β -D-GLUCOPYRANOSYL)ASCORBIC ACID, PROCESS FOR ITS PRODUCTION, AND FOODS AND COS-
METICS CONTAINING COMPOSITIONS COMPRISING IT

(57) Abstract: The present invention provides a novel ascorbic acid derivative as a provitamin C with improved stability in the body and prolonged life in the body compared to conventionally known 2-O-(α -D-glucopyranosyl)ascorbic acid. The composition comprising the novel compound 2-O-(β -D-glucopyranosyl)ascorbic acid has been extracted from plants such as from Ningxia Lycium barbarum L. and/or Lycium chinense Mill. The compositions comprising 2-O-(β -D-glucopyranosyl)ascorbic acid may be enzymatically synthesized using β -D-glucosyltransferase. Pure 2-O-(β -D-glucopyranosyl)ascorbic acid may be produced from such compositions. Alternatively, 2-O-(β -D-glucopyranosyl)ascorbic acid may be produced by chemical synthesis. The 2-O-(β -D-glucopyranosyl)ascorbic acid results in higher stability and a prolonged life of vitamin C when ingested in the body compared to the corresponding α -D-glucopyranosyl derivative, and is therefore highly suitable as a provitamin C to be used in cosmetics and foods.

WO 03/057707 A1

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 01/0857

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 C07H17/04 A23L1/302 C12P19/60 C07H1/08 A61K7/48 A61K31/7048 A61P17/16																				
According to International Patent Classification (IPC) or to both national classification and IPC																				
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 C07H A23L C12P A61K A61Q A61P																				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																				
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, CHEM ABS Data, PAJ																				
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category *</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>EP 0 875 514 A (SHOWA DENKO KK) 4 November 1998 (1998-11-04) table 2 claims</td> <td>1</td> </tr> <tr> <td>A</td> <td>EP 0 875 246 A (SHOWA DENKO KK) 4 November 1998 (1998-11-04) table 2 claims</td> <td>1</td> </tr> <tr> <td>X</td> <td>EP 0 919 218 A (SHISEIDO CO LTD) 2 June 1999 (1999-06-02) abstract</td> <td>2, 3, 19</td> </tr> <tr> <td>X</td> <td>EP 1 145 709 A (SEROBIOLOGIQUES LAB SA) 17 October 2001 (2001-10-17) abstract</td> <td>2, 3, 19</td> </tr> <tr> <td colspan="2" style="text-align: center;">--- -/--</td> <td></td> </tr> </tbody> </table>			Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	EP 0 875 514 A (SHOWA DENKO KK) 4 November 1998 (1998-11-04) table 2 claims	1	A	EP 0 875 246 A (SHOWA DENKO KK) 4 November 1998 (1998-11-04) table 2 claims	1	X	EP 0 919 218 A (SHISEIDO CO LTD) 2 June 1999 (1999-06-02) abstract	2, 3, 19	X	EP 1 145 709 A (SEROBIOLOGIQUES LAB SA) 17 October 2001 (2001-10-17) abstract	2, 3, 19	--- -/--		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																		
A	EP 0 875 514 A (SHOWA DENKO KK) 4 November 1998 (1998-11-04) table 2 claims	1																		
A	EP 0 875 246 A (SHOWA DENKO KK) 4 November 1998 (1998-11-04) table 2 claims	1																		
X	EP 0 919 218 A (SHISEIDO CO LTD) 2 June 1999 (1999-06-02) abstract	2, 3, 19																		
X	EP 1 145 709 A (SEROBIOLOGIQUES LAB SA) 17 October 2001 (2001-10-17) abstract	2, 3, 19																		
--- -/--																				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.																				
* Special categories of cited documents : <table border="0"> <tr> <td style="vertical-align: top;"> *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed </td> <td style="vertical-align: top;"> *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family </td> </tr> </table>			*A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family																
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family																			
Date of the actual completion of the international search		Date of mailing of the international search report																		
11 June 2003		23/06/2003																		
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer de Nooy, A																		

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 667 162 A (BRUNNER RUDOLF) 16 August 1995 (1995-08-16) abstract -----	2, 3, 21

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 02/0357

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0875514	A	04-11-1998	JP 10298174 A EP 0875514 A1 US 6127409 A	10-11-1998 04-11-1998 03-10-2000
EP 0875246	A	04-11-1998	EP 0875246 A1 JP 10330261 A US 2002010210 A1	04-11-1998 15-12-1998 24-01-2002
EP 0919218	A	02-06-1999	EP 0919218 A1 CN 1220595 A CN 1220595 T JP 10316530 A WO 9841183 A1 KR 2000011152 A	02-06-1999 23-06-1999 23-06-1999 02-12-1998 24-09-1998 25-02-2000
EP 1145709	A	17-10-2001	EP 1145709 A1 AU 3373901 A WO 0178675 A1 EP 1272155 A1	17-10-2001 30-10-2001 25-10-2001 08-01-2003
EP 0667162	A	16-08-1995	EP 0667162 A1	16-08-1995